CLAIMS

What is claimed is:

1. An organic photodetector comprising:

an anode;

an active region comprising one or more subcells in series, wherein each subcell comprises an organic electron donor layer and an organic electron acceptor layer, wherein the thicknesses of the organic electron donor layer and the organic electron acceptor layer are low enough to allow tunneling;

an exciton blocking layer; and

a cathode,

wherein the anode comprises a material having a work function greater than about 4.6 eV.

2. The organic photodetector of claim 1, wherein the electron donor layers and the organic electron acceptor layers each have a thickness of less than about 30 Å.

3. The organic photodetector of claim 1, wherein the exciton blocking layer comprises BCP.

4. The organic photodetector of claim 1, wherein the anode has been treated with oxygen plasma, UV ozone, an oxidizing agent, an acid, coated with a p-type doped organic layer, or spin-coating with a transparent conducting organic polymer.

5. The organic photodetector of claim 1, wherein the anode comprises ITO.

6. An organic photodetector comprising:

an anode;

an active region comprising one or more subcells in series, wherein each subcell comprises an organic electron donor layer and an organic electron acceptor layer, wherein the thicknesses of the organic electron donor layer and the organic electron acceptor layer are low enough to allow tunneling;

an exciton blocking layer; and

a cathode,

wherein the electron affinity of the organic acceptor layer is about 0.3 eV less than the work function of the anode.

7. The organic photodetector of claim 6, wherein the electron affinity of the organic acceptor layer is about 0.4 eV less than the work function of the anode.

8. The organic photodetector of claim 6, wherein the electron donor layers and the organic electron acceptor layers each have a thickness of less than about 30 Å.

9. The organic photodetector of claim 6, wherein the exciton blocking layer comprises BCP.

10. The organic photodetector of claim 6, wherein the anode comprises ITO.

11. The organic photodetector of claim 10, wherein the anode has been treated with oxygen plasma, UV ozone, an oxidizing agent, an acid, coated with a p-type doped organic layer, or spin-coating with a transparent conducting organic polymer.

12. An organic photodetector comprising:

an anode;

a first subcell comprising an organic electron donor layer adjacent to the anode and having a sufficient thickness to inhibit tunneling into the adjacent acceptor layer;

one or more additional subcells in series, wherein each additional subcell comprises an organic electron donor layer and an organic electron acceptor layer, wherein the thicknesses of the organic electron donor layer and an organic electron acceptor layer are low enough to allow tunneling;

an exciton blocking layer; and

a cathode.

13. The organic photodetector of claim 12, wherein the organic electron donor layer of the first subcell has a thickness of at least about 60 Å,

14. The organic photodetector of claim 12, wherein the electron donor layers and the organic electron acceptor layers each have a thickness of less than about 30 Å.

15. The organic photodetector of claim 12, wherein the exciton blocking layer comprises BCP.

16. The organic photodetector of claim 12, wherein the anode comprises ITO.

17. The organic photodetector of claim 16, wherein the anode has been treated with oxygen plasma, UV ozone, an oxidizing agent, an acid, coated with a p-type doped organic layer, or spin-coating with a transparent conducting organic polymer.